**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, DC 20554**

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| In the Matter of | ) | |
| | ) | |
| Use of the 5.850-5.925 GHz Band | ) | ET Docket No. 19-138 |
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# PETITION FOR PARTIAL RECONSIDERATION


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## PETITION FOR PARTIAL RECONSIDERATION

The 5G Automotive Association ("5GAA")[1] respectfully asks that the Federal Communications Commission reconsider in part its *First Report and Order* ("*Order*") in this proceeding, specifically, the rules governing the introduction of unlicensed operations into the lower portion of the 5.9 GHz band spanning 5.850-5.925 GHz.[2]

## INTRODUCTION AND SUMMARY

From the outset of this proceeding, 5GAA has supported the Commission's efforts to modernize the 5.9 GHz band—with at least 30 MHz of spectrum initially dedicated to state-of-the-art Cellular Vehicle-to-Everything ("C-V2X") services. If the Commission were to introduce unlicensed operations into the lower portion of the band, 5GAA requested reasonable coexistence parameters that would enable the full C-V2X opportunity in the 5.895-5.925 GHz ("Upper 5.9 GHz") band.

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[1] 5GAA is a global cross-industry organization of companies from the automotive, technology, and telecommunications industries working together to develop end-to-end connectivity solutions for intelligent transportation, future mobility systems and smart cities. *See* 5GAA, www.5gaa.org (last visited May 25, 2021). Formed in 2016, 5GAA has grown from its eight founding members to a global organization of more than 120 companies. Visit https://5gaa.org/membership/our-members/ for a complete list of member companies.

[2] *Use of the 5.850-5.925 GHz Band*, First Report and Order, Further Notice of Proposed Rulemaking, and Order of Proposed Modification, 35 FCC Rcd 13440 (2020) ("*Order*").

The Commission unanimously recognized that C-V2X operations in the Upper 5.9 GHz band "best serves the American public."[3] We applaud that ruling. Yet, the *Order's* imbalanced approach towards coexistence puts at risk the benefits that C-V2X can bring to Americans, subjecting these services to a persistent risk of interference and raising broader questions about the feasibility of safety services in the Upper 5.9 GHz band. And in addition to these policy concerns, there are legal issues as well. In multiple respects, the *Order's* choice of unwanted emission limits fails to satisfy the Commission's obligation under the Administrative Procedure Act ("APA") to fully consider all the relevant facts and to articulate a reasoned explanation of how those facts support its decisions.[4]

5GAA thus seeks reconsideration of one aspect of the *Order*—the unwanted emission limits permitted from new indoor unlicensed access points and client devices operating in the 5.850-5.895 GHz ("U-NII-4") band.[5] Specifically, 5GAA requests that the Commission afford C-V2X an additional 20 dB of protection from these U-NII-4 emissions.[6] An additional 20 dB of protection represents a more balanced, forward-looking approach to coexistence. As demonstrated by 5GAA's technical analysis, this relief would provide necessary protection for

[3] *Order* ¶ 106.

[4] 5 U.S.C. §§ 551-559.

[5] Section 1.429 of the Commission's rules, 47 C.F.R. § 1.429, permits any interested person to petition for reconsideration of a final Commission action, such as the *Order*. 5GAA—a rapidly growing global cross-industry association of companies from the automotive, technology, and telecommunications sectors—encouraged the Commission to launch this proceeding and has participated at every step along the way.

[6] *See* 47 C.F.R. § 1.429(c) (petitions for reconsideration "shall state with particularity the respects in which petitioner believes the action taken should be changed"). For clarity, 5GAA suggests in the attached Exhibit specific rule revisions that would implement the requested relief.

critical safety services while laying the foundation for the full benefits of C-V2X over the longer term. Moreover, this relief would still provide for robust indoor unlicensed operations.

## DISCUSSION

### I. THE REQUESTED RELIEF WILL BETTER ADVANCE COEXISTENCE BETWEEN RELIABLE C-V2X SAFETY SERVICES AND ROBUST INDOOR UNLICENSED OPERATIONS

In the *Order*, the Commission unanimously recognized the public interest benefits of proceeding with C-V2X in the Upper 5.9 GHz band. It concluded that assigning the upper 30 MHz exclusively to C-V2X "is the best decision for promoting robust [intelligent transportation system] deployment in the 5.9 GHz band in the coming years,"[7] praised the technology's "ability to achieve greater network effects and leverage cellular networks to reduce infrastructure costs,"[8] and ultimately decided that moving forward with C-V2X "best serves the American public."[9]

Yet, the *Order's* approach to coexistence places C-V2X's benefits at risk. In calculating the unwanted emission limits necessary to protect and advance this safety service, the *Order* relies on a series of assumptions that in each instance subject C-V2X to greater and greater levels of unwanted emissions. *First*, it assumes the sufficiency of the existing U-NII-3 limits, despite compelling arguments made in an unresolved request for reconsideration of those limits.[10] *Second*, it assumes the U-NII-3 limits are appropriate starting points for protecting against U-NII-4 emissions, despite showings from 5GAA and others that the technical realities of U-NII-4

[7] *Order* ¶ 105.

[8] *Id.*

[9] *Id.* ¶ 106.

[10] *See* Alliance of Automobile Manufacturers, Association of Global Automakers, Inc., Petition for Reconsideration, ET Docket No. 13-49 (filed May 6, 2016).

operations necessitate greater protection levels than afforded from U-NII-3 operations.[11] *Third*, it assumes that all indoor access points will experience at least 20 dB of building attenuation loss. While many unlicensed access points will experience some building attenuation loss, a 20 dB loss cannot be assumed in every instance.[12] *And fourth*, it assumes that C-V2X can withstand the further increases in unwanted emissions that would result from the *Order's* abrupt departure from the existing measurement procedures applicable to other 5 GHz U-NII devices.[13] This departure—changing from peak measurement procedures to RMS measurement procedures—results in an additional 10-20 dB of unwanted emissions permitted into the C-V2X frequencies.[14]

Relying on these assumptions, the *Order* arrives at an unwanted emission limit for U-NII-4 indoor access points that is 30-40 dB more relaxed than the U-NII-3 limit. This limit permits an increase by a factor of 1,000-10,000 times the level of unwanted emissions that can occur in

[11] *See* Letter from Sean T. Conway, Counsel to 5GAA, to Marlene H. Dortch, Secretary, FCC, (Oct. 21, 2020) ("5GAA Oct. 21st Letter") (explaining that U-NII-4 operations will result in higher, more frequent, and more widespread unwanted emissions reaching the 5.895-5.925 GHz band than occurs from U-NII-3 operations); *see also* Comments of 5GAA , at Sec. III.A.1 (June 2, 2021) ("5GAA Comments"). Unless otherwise noted, all comments and letters cited herein were filed in ET Docket No. 19-138.

[12] *See* Letter from John Kuzin, Qualcomm, to Marlene H. Dortch, Secretary, FCC, at 2 (Nov. 5, 2020) (explaining that not all building and operational scenarios provide 20 dB average building entry and exit losses).

[13] *See Order* ¶ 85.

[14] *See* Comparison of Unwanted Emissions Under Peak and RMS Measurements ("Measurement Comparison"), *attached as* Exhibit B to 5GAA Comments and incorporated herein by reference. *See also Order* ¶ 84.

the Upper 5.9 GHz band.[15] Curiously, these limits are even more liberal than those requested by the Wi-Fi industry's own advocacy arm, the Wi-Fi Alliance.[16]

5GAA's technical analysis demonstrates the immediate impacts of these higher emissions on C-V2X performance. As demonstrated in Exhibit C to the 5GAA Comments, 5GAA evaluated the impact of the *Order's* U-NII-4 limits on C-V2X performance.[17] It then compared those results against C-V2X performance in the face of that same Wi-Fi usage under the relief requested herein. The analysis offers several important insights.

First, the higher levels of U-NII-4 unwanted emissions resulting from the *Order*'s rules significantly reduce C-V2X's communications range. Specifically, C-V2X's effective communications range was reduced by more than 50% when compared against 5GAA's preferred approach. And second, this reduced range significantly impacts C-V2X's ability to support critical safety applications.

As part of its assessment of the *Order*, 5GAA analyzed the impact of this reduced range on C-V2X's ability to support Intersection Movement Assist warnings.[18] In 5GAA's evaluation

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[15] This factor is calculated using $F = 10^{\frac{G}{10}}$, where F is the Factor, and G is the increase from the previous emission limits in dB.

[16] As discussed further herein, the *Order* claims to adopt the Wi-Fi Alliance's proposal for unwanted emissions, but this is misleading at best. The *Order* adopted the same *numerical* limit proposed by the Wi-Fi Alliance, but then decided to measure it differently. That is, the *Order* specified RMS measurements for such limits even though the Wi-Fi Alliance did not request RMS measurements. Rather, the Wi-Fi Alliance acknowledged that current Commission procedures for 5 GHz U-NII device testing require measurements of "peak, not average, unwanted emissions." Comments of Wi-Fi Alliance, at 7 (Mar. 9, 2020) ("Wi-Fi Alliance Comments").

[17] *See* 5GAA, Analysis of Coexistence Between U-NII-4 Devices and C-V2X Under 2020 *5.9 GHz R&O and FNPRM* (June 2021) ("5GAA Coexistence Analysis"), *attached as* Exhibit C to 5GAA Comments and incorporated herein by reference.

[18] Intersection Movement Assist provides warnings to drivers when it is not safe to enter an intersection due to a high collision probability. USDOT, *Safety – Intersection Movement Assist*,

scenario, a vehicle is traveling at typical speeds towards an intersection while a second vehicle approaches that same intersection from a perpendicular road.[19] Under emission levels consistent with 5GAA's requested relief, C-V2X could timely deliver warnings to the first vehicle that provide its driver with approximately four seconds of reaction time. Yet, when hindered by U-NII-4 unwanted emissions at levels identified in the *Order*, C-V2X's reduced range delayed the reliable delivery of this warning, reducing the driver reaction time to approximately one second. Importantly, the U.S. National Highway Traffic Safety Administration ("NHTSA") estimates that the average driver requires a minimum time of approximately 1.5 seconds to perceive and react to dangerous conditions.[20] This decrease in available reaction time—from more than four seconds to one second—poses significant impacts to safety.[21]

Beyond these immediate considerations, permitting excessive levels of unwanted emissions is particularly short-sighted in light of the limitations of post-hoc interference remediation mechanisms. The Commission's post-hoc enforcement mechanisms are not designed to locate interference caused by U-NII-4 consumer devices. When one of those devices

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https://www.its.dot.gov/infographs/intersection_movement.htm (last visited May 25, 2021). The U.S. Department of Transportation identifies Intersection Movement Assist as a critical application for addressing intersection crash scenarios. It is particularly valuable in urban canyon intersection traffic environments, where a driver's line-of-sight may be blocked by buildings, other vehicles, or pedestrians. In other words, it is most valuable in the exact type of environment most susceptible to indoor U-NII-4 operations at high activity levels.

[19] 5GAA used a real intersection with crash history in Ann Arbor, Michigan and assumed both vehicles were traveling at 25 mph, which is the actual speed limits for these roads. *See* 5GAA Coexistence Analysis at 10-11, 22, 24.

[20] *See, e.g.*, NHTSA, *Why your reaction time matters at speed*, Safety 1n Num3ers (Aug. 2015), https://one.nhtsa.gov/nhtsa/Safety1nNum3ers/august2015/S1N_Aug15_Speeding_1.html; Neil D. Lerner, *Brake Perception-Reaction Times of Older and Younger Drivers*, 37 Proc. Hum. Factors & Ergonomics Soc'y 37th Ann. Meeting 206, 206 (1993).

[21] These performance impacts are also clearly relevant to any coexistence assessment under the Commission's Part 15 rules. *See, e.g.*, 47 C.F.R. §§ 15.5(b), 15.3(m).

creates harmful interference, neither C-V2X users, *e.g.*, drivers, nor the Commission will have any ready means of tracing that degraded performance to interference from an unlicensed device, let alone identifying which unlicensed device is responsible for the interference. Further compounding these concerns, indoor U-NII-4 access points will almost all be located on private property. Thus, even if a C-V2X roadside unit licensee were to identify interference, it would be effectively impossible for the licensee or Commission officials to stop the majority of interfering transmissions in these circumstances. These practical challenges alone make clear the need for a more forward-looking approach for arriving at U-NII-4 unwanted emission limits.

Moreover, the U-NII-4 limits should also reflect the significant public interest in achieving network effects to support the rapid, broad adoption of C-V2X technology. While 5GAA and its members are committed to the widespread deployment of C-V2X, permitting excessive unwanted emissions could raise concerns about the viability of safety services in the Upper 5.9 GHz band, delaying or even denying the network effects policymakers and transportation stakeholders hope and expect to achieve.[22]

In providing the requested additional 20 dB of protection, the Commission would address these concerns, ensuring the improved effectiveness of C-V2X in the immediate term and laying the foundation for the full benefits of this technology in the Upper 5.9 GHz band. And even with this relief, the rules will still enable robust indoor unlicensed operations—and be consistent with the levels requested by the Wi-Fi Alliance that were based on peak OOBE levels. Indeed, 5GAA's request provides indoor unlicensed users with an additional 10 dB of flexibility

[22] The impact of the *Order's* unwanted emissions limits presumably would be more deleterious for Dedicated Short Range Communications technology given C-V2X's superior radio performance.

compared to the unwanted emission limits applicable today to the U-NII-3 band when those limits are extended into the new U-NII-4 band.

In sum, 5GAA's recommended relief provides an opportunity to advance sound, balanced, and forward-looking coexistence policies—allowing for both highly reliable C-V2X safety services and robust indoor unlicensed operations.

## II. THE *ORDER*'S UNWANTED EMISSION LIMITS ARE ARBITRARY AND CAPRICIOUS

The choice of unwanted emission limits in the *Order* is not merely problematic from a policy perspective but is also legally deficient under the APA. In adopting those limits, the *Order* failed to examine all the relevant facts and articulate a reasoned explanation that considers those facts, rendering the choice of unwanted emission limits arbitrary and capricious in violation of the APA. In short, the *Order* adopts unwanted emission limits without adequate explanation, and then undercuts the chosen limits and the rationale for them by allowing a measurement approach that further detrimentally weakens those limits.

First, the basis for the *Order*'s choice of out-of-band emission limits is the purported success of equivalent limits for U-NII-3 emissions. The *Order* states that the U-NII-3 out-of-band emission limits have "proven to be effective" to protect DSRC operations and finds that conclusion to be a sufficient basis for imposing the same level of protection from U-NII-4 devices. [23] In doing so, however, this portion of the *Order* makes no mention of the fact found elsewhere in the *Order*—which clearly underlays the basic premises of action here—that DSRC "has barely been deployed."[24] In fact, only a few thousand cars with DSRC have ever been sold.

[23] *Order* ¶ 83.

[24] *Id.* ¶ 3; *see also id.* ("this spectrum has been largely unused"), ¶ 7 (DSRC "has not been widely deployed"), App. E ¶ 1 (DSRC "deployment has been relatively limited within the consumer automobile market").

The effectiveness of interference parameters for such a thinly deployed service cannot simply be presumed to be proven and thus adequate for the much more robust deployment that the *Order* was intended and expected to spur. To comply with the APA, an agency must "articulate a satisfactory explanation for its action *including a rational connection between the facts found and the choice made*."[25] A decision is arbitrary and capricious in violation of the APA if the agency does not consider an important aspect of a problem.[26] Here, the *Order* takes a factual premise based on one situation (the "proven effectiveness" of interference protections in the context of "barely" deployed DSRC)[27] and applies it without analysis to a very different situation (*i.e.*, the expected nationwide deployment of C-V2X) without considering or even acknowledging that important distinction. This portion of the *Order* fails to make a rational connection between the facts and the decision and is thus legally inadequate.

Relatedly, the *Order* does not analyze the risk of interference caused by the combination of more intensive unlicensed use of the U-NII-4 band and more intensive use of the ITS band as a result of C-V2X deployment. The record shows that these increased operations warrant greater protections than those provided for U-NII-3.[28] Yet the *Order* does not address this concern, and makes no mention of the 5GAA filing raising it.

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[25] *National Lifeline Ass'n v. FCC*, 921 F.3d 1102, 1110 (D.C. Cir. 2019) (emphasis added), citing *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

[26] *See id.*

[27] *Order* ¶¶ 3, 83.

[28] 5GAA explained that heavy use of the U-NII-4 band will result in longer sustained periods of interference. *See* 5GAA Oct. 21st Letter at 4. When combined with the adjacent U-NII-3 band, the U-NII-4 band will offer opportunities for an additional 80 MHz channel—and the only contiguous 160 MHz channel in the 5 GHz U-NII bands without a dynamic frequency selection requirement.

Moreover, although the *Order* purports to adopt an emissions limit that will provide an equivalent level of protection as the limits for U-NII-3 devices, it undercuts that reasoning by mandating a measurement approach that actually allows increased unwanted emissions.[29] The choice of emission limit is not reasonably explained in the context of the change in measurement approach. And at the same time, the change in measurement approach is not adequately justified in light of its impact on the level of protection provided. The *Order* starts from the premise that the same level of protection that was afforded from U-NII-3 devices will be appropriate for U-NII-4 devices and then concludes that this level of protection can be provided by adopting the Wi-Fi Alliance's proposed limits on unwanted emissions from indoor unlicensed devices.[30] In effect, however, the *Order* did not adopt the Wi-Fi Alliance proposal because in the paragraphs that follow, it adopts a measurement method that allows for higher unwanted emissions than the Wi-Fi Alliance proposal contemplated.

Traditionally, the Commission has used a peak measurement for assessing 5 GHz U-NII out-of-band emissions, as the Wi-Fi Alliance noted in its comments. Those comments expressly acknowledge that "current Commission measurement procedures for U-NII device compliance testing require application of peak, not average, unwanted emission levels."[31] There is no question the Wi-Fi Alliance proposal was made with this measurement approach in mind. But the *Order* abandons this traditional peak measurement approach in favor of an RMS measurement that, as 5GAA has shown, allows for approximately 10-20 dB more unwanted

[29] *See Order* ¶¶ 83-85.

[30] *Id.* ¶ 83.

[31] Wi-Fi Alliance Comments at 7.

emissions than would peak limits.[32] The *Order* adopts a measurement standard that undercuts its chosen limit for out-of-band emissions, but entirely refuses to acknowledge that contradiction, much less explain why it was nonetheless reasonable. This inability to make a rational connection—indeed, any connection—between the facts and the decision is arbitrary and capricious.

The choice of a different measurement standard is similarly arbitrary and capricious, as the *Order* offers no meaningful analysis of whether C-V2X operations will be able to tolerate the additional unwanted emissions that the RMS measurement approach will permit. The *Order* merely concludes that RMS measurement is "more appropriate" because peak power levels are not continuous but "may only be reached occasionally and for short periods."[33] This is little more than a description of the two measurement types. It ignores critical questions of whether C-V2X operations can accept the higher peak emissions and why an RMS measurement is more suitable for assessing the impact of unwanted emissions on C-V2X services. Given the *Order*'s failure to consider and address all relevant factors, this portion of the decision, too, is arbitrary and capricious.

## CONCLUSION

The Commission was correct in concluding that C-V2X services in the Upper 5.9 GHz band will best serve the American public. But to capitalize on the full C-V2X opportunity in these frequencies, the Commission should revisit the out-of-band emissions limits for indoor access points, subordinate devices, and client devices consistent with the relief requested herein.

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[32] *See* Measurement Comparison. *See also Order* ¶ 84 (noting WISPA statement that peak measurements allow signal levels 10 and 20 dB higher than RMS measurements).

[33] *Order* ¶ 85.

Respectfully submitted,

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By: */s/ Sean T. Conway*

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## **Exhibit**

To amend Section 15.407(b)(5) of Title 47 of the C.F.R.

47 C.F.R. § 15.407(b)(5) is amended:

1) In subsection (b)(5)(i), by striking "15 dBm/MHz and shall decrease linearly to an e.i.r.p. of -7" and inserting "-5 dBm/MHz and shall decrease linearly to an e.i.r.p. of -27"

2) In subsection (b)(5)(ii), by striking "-5 dBm/MHz and shall decrease linearly to an e.i.r.p. of -7" and inserting "-25 dBm/MHz and shall decrease linearly to an e.i.r.p. of -47"

* * *

For clarity the 47 C.F.R. § 15.407(b)(5) so amended would read:

(5) For transmitters operating solely in the 5.850-5.895 GHz band or operating on a channel that spans across 5.725-5.895 GHz:

(i) For an indoor access point or subordinate device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of ~~15~~ [**-5**] dBm/MHz and shall decrease linearly to an e.i.r.p. of ~~-7~~ [**-27**] dBm/MHz at or above 5.925 GHz.

(ii) For a client device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of ~~-5~~ [**-25**] dBm/MHz and shall decrease linearly to an e.i.r.p. of ~~-27~~ [**-47**] dBm/MHz at or above 5.925 GHz.